

REMARKS

Claims 1-18 are pending in the above-identified application and stand rejected. Applicant, having amended the application, respectfully requests reconsideration.

Amendments to the Specification

The examiner objected to Applicant's paragraph 0001 due to the inclusion of a pair of blank spaces reserved for application serial numbers that had not been assigned as of the time of filing. Paragraph 0001 is amended herein to include the appropriate serial numbers.

Applicant has amended paragraph 0054 of the specification to clarify an aspect of Applicant's embodiment of Figures 33A and 33B. The last sentence of that paragraph notes:

the actuator is designed so that the reflective surface 3323 is as great a percentage of the total actuator area (including the exposed portions of the actuator support) as practical, which is over 25% in the depicted embodiment.

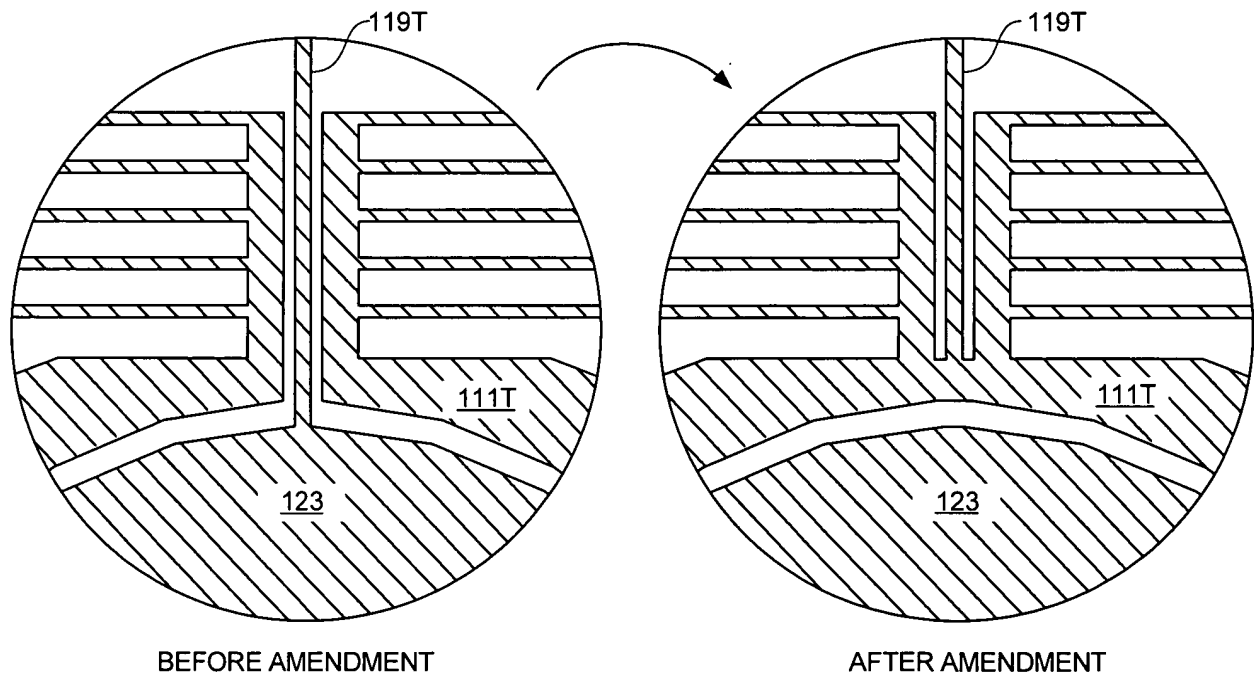
(Specification, paragraph 0054, emphasis added to show addition.)

The cited area efficiency relays the point that the mirror surface is large relative to the amount of area occupied by the entire actuator. In Figure 33A, for example, the entire actuator assembly is bounded by silicon 3330, to which the moving portions of the actuator assembly are electrically connected -- and from which the moving portions are suspended -- via hinges 3319T/B. The "total actuator area" referred to in paragraph 0054 is the area occupied by the various features of Figure 33A bounded by areas 3330, including the combs, frame, actuated member, and the interstitial spaces exposing the underlying actuator support.

This understanding is supported in Figures 33A and 33B, in which reflective surface 3323 is just over 25% of the total area bounded by, but not including, silicon 3330. In light of this and other support, the amendment does not introduce new matter.

### Amendments to the Figures

Applicant amended Figure 1 as shown in red ink on the attached sheet. The amendment is difficult to highlight in ink, so the amended portion is reproduced below for ease of review. The amendment is supported in Figure 1A (the other frame hinge 119T is correctly attached) and Figure 1B, which shows the bottom half 119B associated with top half 119T. No new matter is added.



In addition, Figure 33A is amended to consistently number region 3330. The correction is obvious, and does not introduce

new matter.

Rejections under 35 U.S.C. section 102(b)

The examiner rejected claims 1-4 and 8-18 under 35 U.S.C. 102(b) as being anticipated by Chang et al. (U.S. 5,959,516). Applicant deals with each rejection in turn.

Claims 1-4

Claim 1 recites a "process sequence for manufacturing MEMS structures from a first material layer of a first-material-layer thickness disposed over and in contact with a second material layer." The claimed sequence lists four sub-processes, support for which is included in, for example, Figures 38-41. While claim 1 is not limited to that particular example, an explanation of claim 1 in the context of that embodiment might prove useful.

Element (a) of claim 1 recites: "forming a mask over the first material layer, wherein the mask leaves portions of the first material layer exposed..." Figure 38, reproduced below, supports this element with the inclusion of a mask, formed from the top two layers, disposed over a "first material layer" 3410 and leaving portions of layer 3410 exposed.

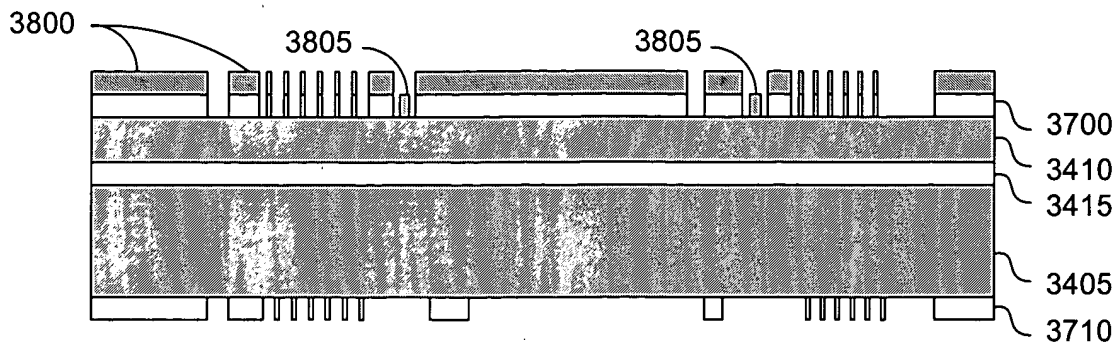


FIG. 38

Element (b) of claim 1 recites: "etching the first material layer in the exposed portions to a first depth less than the first-material-layer thickness, wherein the masked portions form a raised pattern defined by recessed areas formed in the exposed portions..." Figure 39, reproduced below, supports this element, illustrating that the exposed portions of material layer 3410 are etched to a depth less than the thickness of layer 3410, and that the masked portions of material layer 3410 "form a raised pattern defined by recessed areas formed in the exposed portions" of material layer 3410.

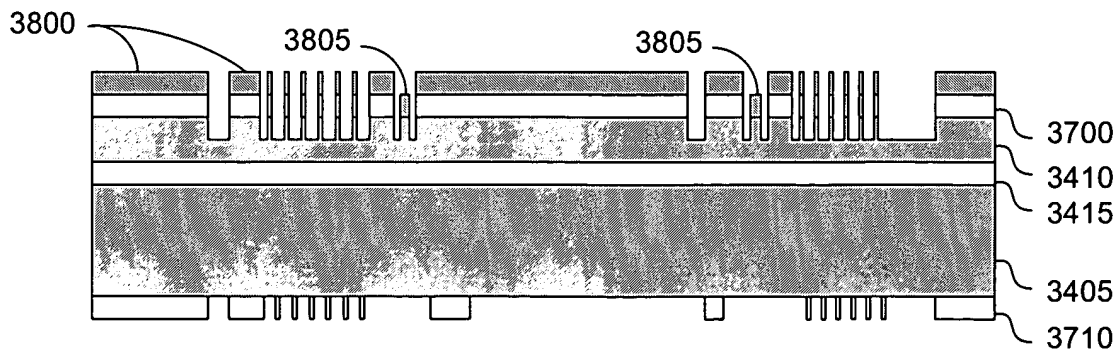
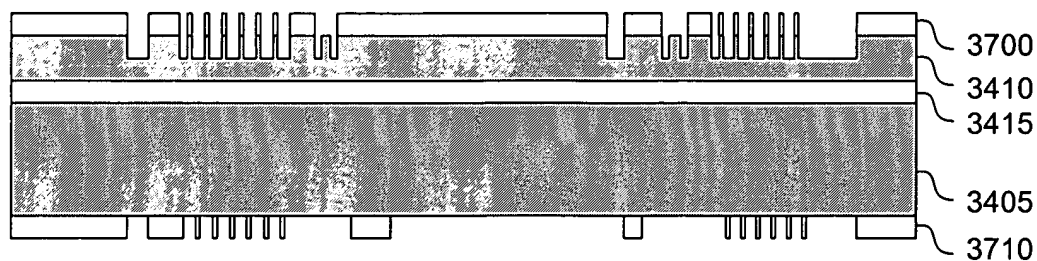


FIG. 39

Element (c) of claim 1 recites: "removing at least a portion

of the mask, leaving at least a portion of the raised pattern and the recessed areas [of the first material layer] exposed..." Figure 40, reproduced below, shows how a portion of the mask formed by the two top-most layers of Figures 38 and 39 is removed (the top mask layer is removed), leaving exposed both the recessed areas formed by the preceding etch step and a portion of the raised pattern. The portions of the raised pattern are, in the example, a pair of small protrusions extending up from material layer 3420 and not covered by layer 3700, which were defined by hinge patterns 3805 (Figures 38 and 39).



**FIG. 40**

Element (d), the final element of claim 1, recites: "etching the exposed raised pattern and recessed areas of the first material layer until the second material layer is exposed in the recessed areas, leaving the pattern affixed to the second material layer." Figure 41, reproduced below, shows how both the exposed and raised patterns and the recessed areas of material layer 3410 are etched until layer 3415, a "second material layer," is exposed, which leaves the patterned layer 3410 affixed to layer 3415.

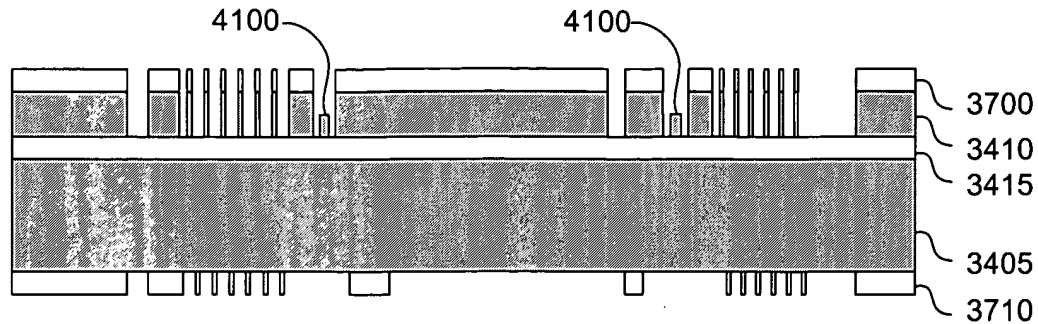


FIG. 41

The examiner rejected claim 1 as anticipated by Chang et al., referring specifically to their Figures 5a-5c and the associated text. Applicant understands the examiner to be arguing that layer 64 in Figures 5a-5c of Chang et al. meets the limitations of the recited "first material layer," and that the described process treats layer 64 to the claimed process sequence. Applicant respectfully disagrees.

The Chang et al. process of Figures 5a-5c has some similarities with the claimed process: layer 64 is, for example, patterned and etched to a depth less than the material thickness. The process sequence of claim 1 differs from that taught by Chang et al., however; in the claimed sequence, a portion of the raised pattern (e.g., the protrusions of Figure 41) is exposed in (c), and both the recessed areas and the raised pattern are etched. In contrast, the raised pattern created by the etch step of Chang's Figure 5a is not etched; instead, etching is limited to recessed portions (area 24 of Figure 5b).

The Chang process does not leave exposed portions of a raised pattern and recessed areas, as recited in element (c) of claim 1, and does not etch both the raised pattern and recessed areas to leave the pattern affixed to an underlying material

layer as recited in element (d). Applicant's claim 1 therefore distinguishes Chang et al. The rejection of claim 1 over that reference should therefore be withdrawn.

Claims 2-4 depend from claim 1, and consequently distinguish Change et al. for at least the same reasons claim 1 distinguishes. The rejections of claims 2-4 should therefore be withdrawn.

Claims 8-13

Claim 8 is in some ways similar to claim 1. Claim 8 recites, for example,

- c. removing the mask [from a first material layer etched to a first depth to form a raised pattern], leaving the raised pattern and the recessed areas exposed; and
- d. **etching the raised pattern and recessed areas** of the first material layer until the second material layer is exposed in the recessed areas, leaving the pattern affixed to the second material layer.

(Claim 8, emphasis added.) These elements are similar to elements (c) and (d) of claim 1, and may be understood with reference to the above-reproduced Figures 40 and 41.

The Chang et al. process does not leave exposed portions of a raised pattern and recessed areas, as recited in element (c) of claim 8, and does not etch both the raised pattern and recessed areas to leave the pattern affixed to an underlying material layer as recited in element (d). Applicant's claim 8 therefore distinguishes Chang et al. The rejection of claim 8 over that reference should therefore be withdrawn.

Claims 9-13 depend from claim 8, and consequently distinguish Change et al. for at least the same reasons claim 8

distinguishes. The rejections of claims 9-13 should therefore be withdrawn.

Claims 14-18

Claim 14 is in some ways similar to claim 1. Claim 14 includes, for example, leaving portions of a raised pattern and recessed areas of a first material layer exposed, and etching the recessed areas and the raised pattern "until [a] second material layer is exposed in the recessed areas, leaving the pattern affixed to the second material layer..." As noted above in connection with the rejection of claim 1, the referenced Chang process does not leave exposed portions of a raised pattern and recessed areas, as recited in element (c) of claim 14, and does not etch both the raised pattern and recessed areas to leave the pattern affixed to an underlying material layer as recited in element (d). Applicant's claim 14 therefore distinguishes Chang et al. The rejection of claim 14 over that reference should therefore be withdrawn.

Claims 15-18 depend from claim 1, and consequently distinguish Change et al. for at least the same reasons claim 14 distinguishes. The rejections of claims 15-18 should therefore be withdrawn.



Rejections under 35 U.S.C. 103

Claims 5-7 stand rejected under section 103(a) as being unpatentable over Chang et al. in view of O'Neill (4,957,592). Claim 5 depends from claim 1, and consequently includes the elements described above in connection with reproduced figures 38-41. Claim 5 adds to these elements a sequence for forming a second collection of MEMS structures, and is supported e.g. by the process sequence depicted in Applicant's Figures 42-48. The claimed method, as illustrated in the cross-section of Applicant's Figure 49, provides a means of forming opposing MEMS features. In the example of Applicant's Figure 49, the opposing MEMS structures are combs formed from separate material layers (e.g., a first material layer and a third material layer).

To support a rejection under §103, the examiner must establish a *prima facie* case of obviousness. References combined to establish a *prima facie* case must, among other things, "teach or suggest all the claim limitations" (MPEP 706.02(j)). Neither Chang et al. nor O'Neill teach or suggest the formation of two collections of MEMS structures from separate material layers. In addition, the examiner has pointed to nothing in those references that suggest the desirability of such a formation, or a means of obtaining the same. The rejection of claim 5 should be withdrawn because the references fail to teach each element of the claim 5, and do not include any suggestion to somehow combine the teachings in the references to accomplish the claimed method.

Claims 6 and 7 depend from claim 5, and consequently distinguish Chang et al. and O'Neill for at least the same reasons claim 5 distinguishes. The rejections of claim 6 and 7 should therefore be withdrawn.

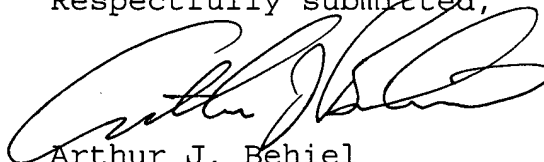
New Claims

New claim 19 recites a micro-machining method in which two mask layers are formed over a material layer and are used, in combination with a pair of etchings, to create a raised pattern. Support for claim 19 is found, for example, in Applicant's Figures 38-41, in which layers 3700 and 3800 provide support for the first and second mask layers, and layer 3410 provides support for the material layer. Claims 20-24 depend from claim 19, and therefore distinguishes the cited references for at least the same reasons claim 19 distinguishes.

CONCLUSION

In light of the foregoing remarks and amendments, the pending claims are in condition for allowance; accordingly, Applicant respectfully requests a notice of allowance. If the examiner's next action is other than allowance of the pending claims, the Examiner is requested to call Applicant's attorney at (925) 621-2113.

Respectfully submitted,



Arthur J. Behiel  
Reg. No. 39,603

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail in an envelope addressed to: Mail Stop, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450. on July 22, 2004

Laurie Moreno  
Name

  
Signature

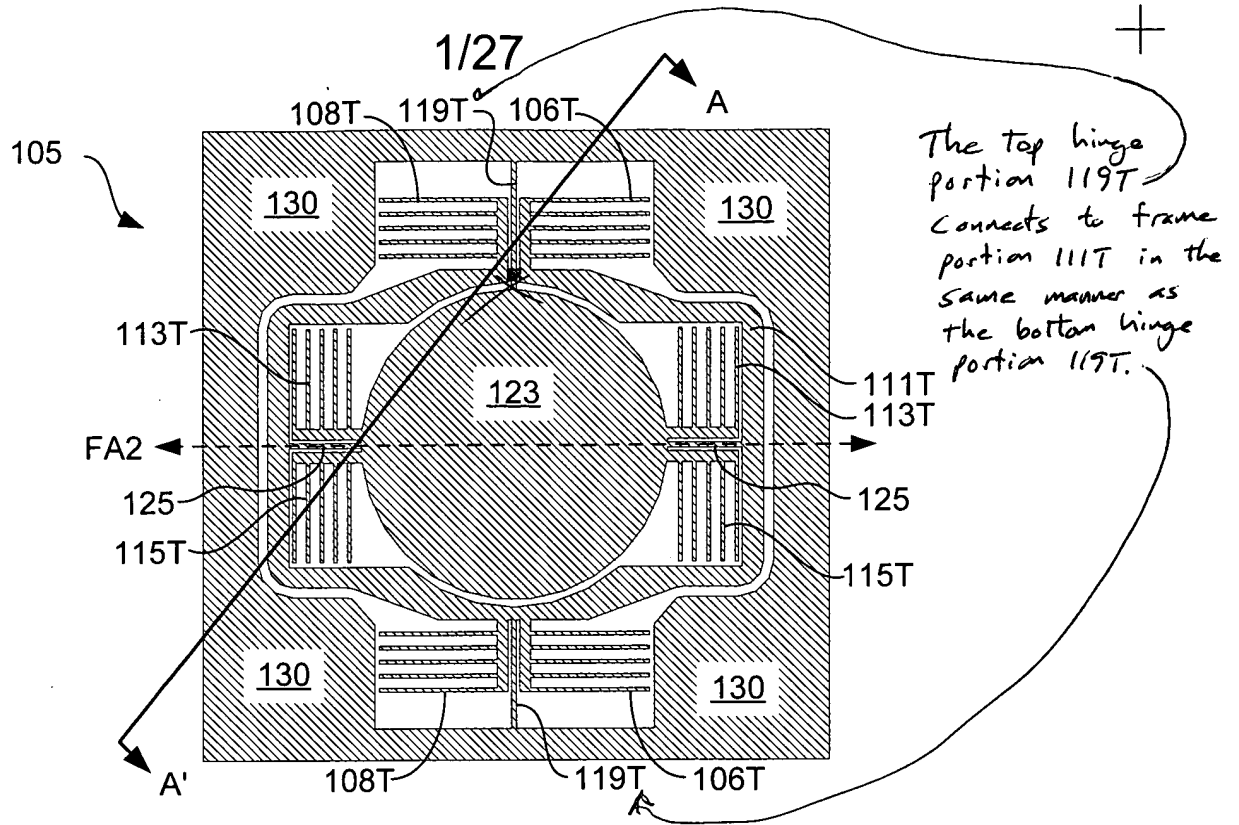


FIG. 1A

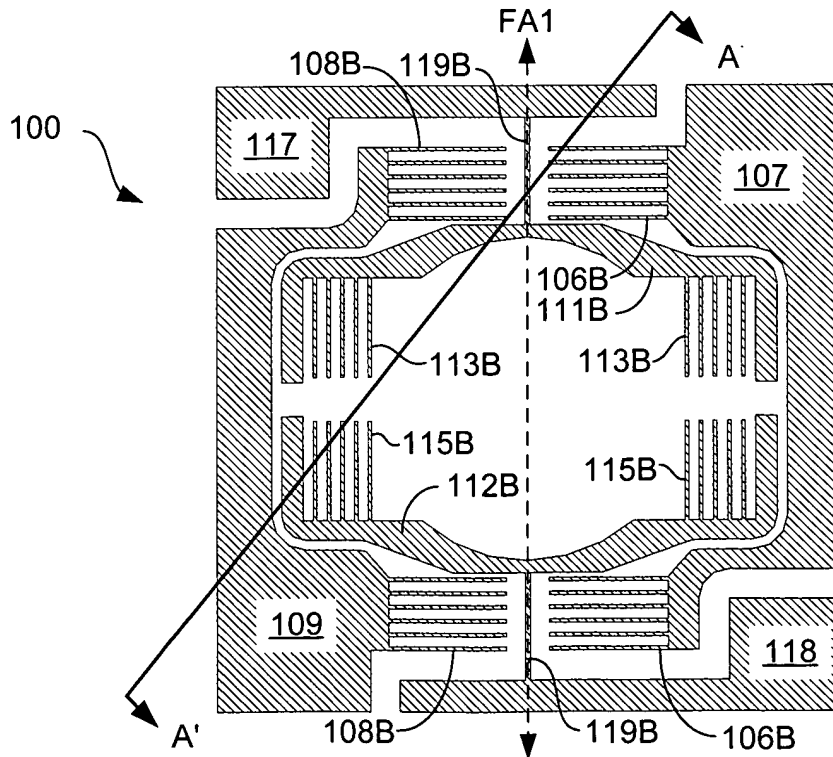


FIG. 1B



10/27

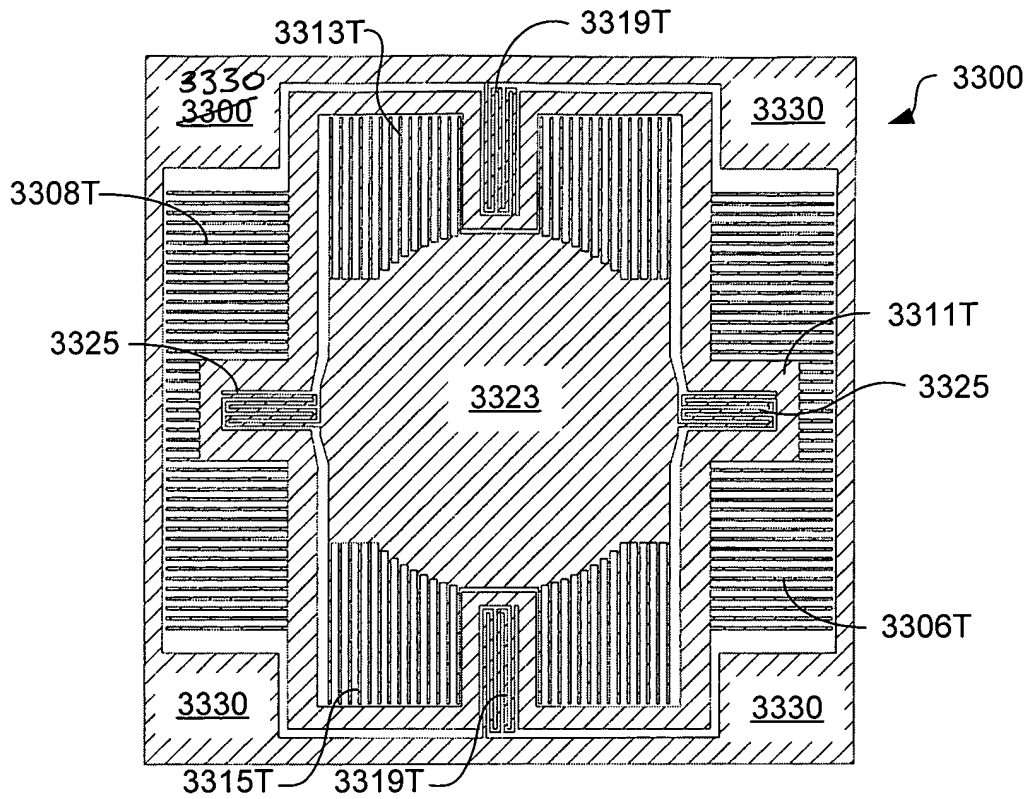


FIG. 33A

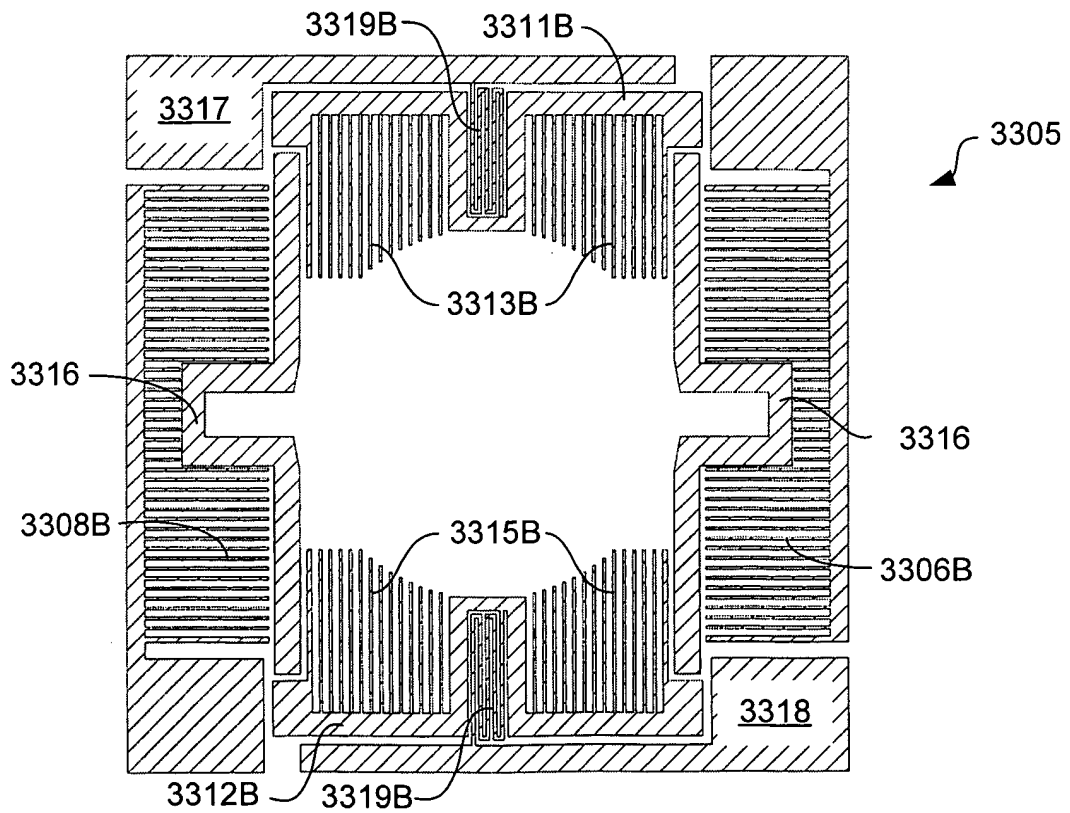


FIG. 33B